

# Massachusetts Green Dairy Project

Massachusetts Dairy Revitalization Task Force

September 7, 2007

Old Sturbridge, MA



# SJH and Company, Inc.

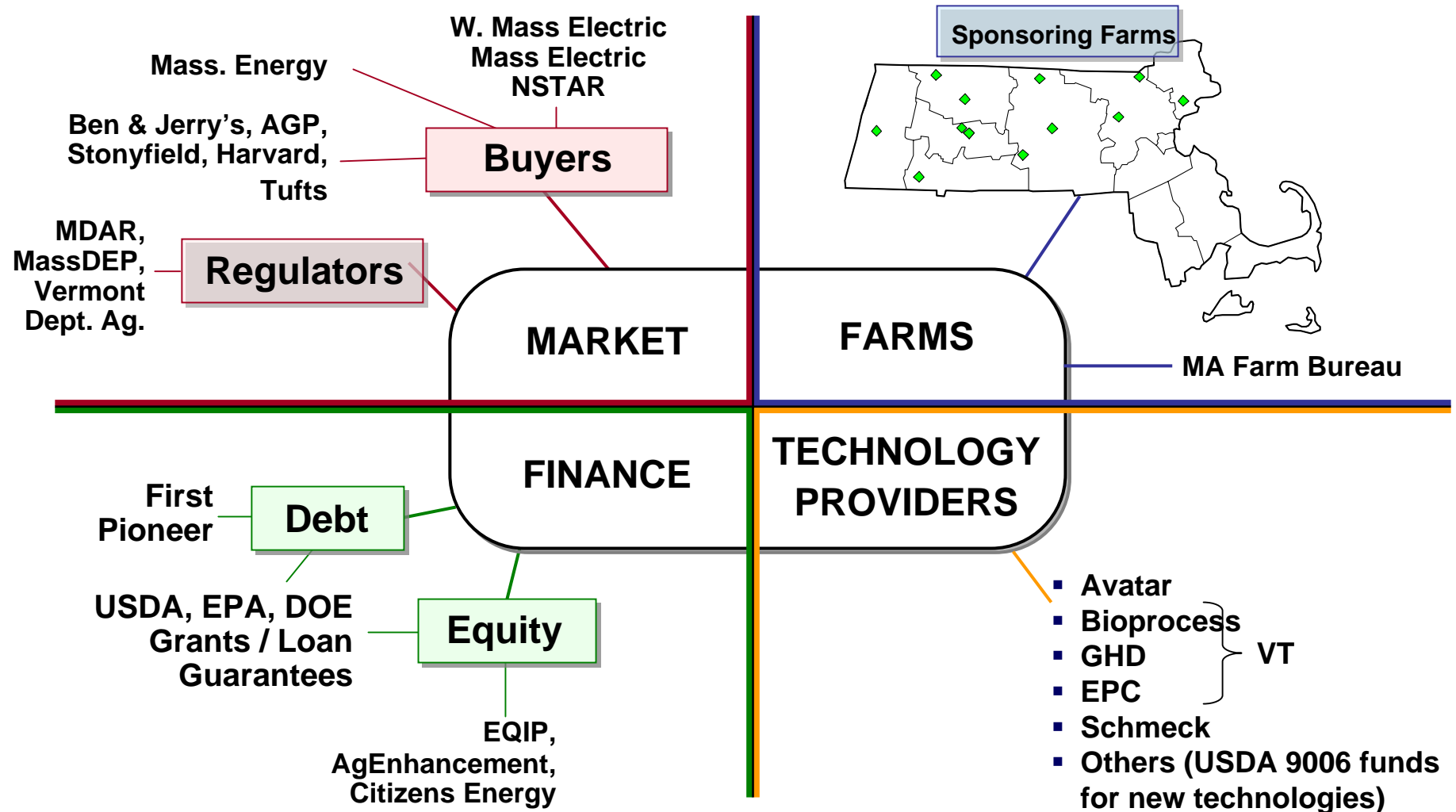
- SJH, headquartered in Boston, MA and founded in 1993, is a strategic management consulting with over 15 years of experience providing independent and objective feasibility studies and business / marketing plans to clients operating – or looking to operate in – the alternative energy or agri-food industries.

|                      |  |
|----------------------|--|
| Headquarter Location | Boston, MA   |
| Website              | <a href="http://www.sjhandco.com">www.sjhandco.com</a>   |
| Affiliate Offices    | Kansas City, MO<br>Washington, D.C.<br>Paris, France   |
| Year Founded         | 1993   |
| Years of Experience  | 15   |
| Company Type         | Strategic Management Consulting  |
| Industries Served    | Agricultural-Based / Biomass-Based Renewable Energy<br>All levels of the agribusiness industry |
| Number of Staff      | 10   |

# SJH and Company, Inc. – Renewable Energy Experience

|  |  |
|--|--|
| <b>Agricultural-Based Renewable Energy Sector Experience</b>                           | Anaerobic digestion of animal waste and renewable natural gas and on-farm / commercialized green electricity;<br>Agricultural-based biomass feedstock-to-biogas and biofuel energy conversion technologies;<br>Agricultural based biomass feedstock source analysis for global markets;<br>Corn and grain-based ethanol, alternative and mixed feedstock ethanol, including cellulosic and carbonaceous feedstocks-to-syngas;<br>Biodiesel;<br>Other unadulterated and adulterated agricultural-based biomass feedstock to renewable energy. |
| <b>Alternative Energy Client Base</b><br><i>(Client names considered confidential)</i> | Economic Development Agencies<br>Local, State, and Federal Government Agencies<br>Trade Associations<br>Quasi-Government Entities<br>Public and Private Project and Technology Developers<br>Private Equity Firms<br>Fortune 100 Companies Seeking to Engage in Ag-energy Expansions<br>Emerging Renewable Energy Businesses<br>Financial Institutions<br>Farmer Groups  |
| <b>Alternative Energy Services</b>   | Feasibility Studies (Organic and Third-Party Reviews / Validations)<br>Market and Competitive Assessments<br>Financial Analysis (Organic and Third-Party Reviews)<br>Mergers and Acquisitions, Technology Evaluations, and Due Diligence<br>Strategic Planning – What, Where, How, and the Financial Implications<br>Business and Market Planning<br>Program and Policy Evaluation   |

# Green Circle Project Overview



- SJH serves the “Green Circle” partners as a project manager.

# Mass. "Green Circle" Cow Power Estimate Revenue Potential

- Total of 16,000 dairy cows on roughly 150 dairies.
- 900 kwh / cow / year + 15 carbon credits / cow / year
  - \$2.5 million from 18.8 million kwh @ \$0.13 / kwh vs. \$0.05 - \$0.07 / kwh of electricity, plus \$5 million from 437,000 carbon credits.

| Farms                           |               |                 |                 |                 |               | Totals                    |
|---------------------------------|---------------|-----------------|-----------------|-----------------|---------------|---------------------------|
| Cows per Dairy                  | 0-99          | 100-199         | 200-299         | 300-599         | 600-1315      |                           |
| Number of dairies               | <b>70</b>     | <b>50</b>       | <b>18</b>       | <b>7</b>        | <b>2</b>      | <b>147</b> (of 165 total) |
| <b>Electricity</b>              |               |                 |                 |                 |               |                           |
| Total (thousand kwh/yr)         | -             | 6,750           | 4,050           | 2,835           | 2,160         | <b>15,795</b>             |
| Price per kWh                   | \$ 0.13       | \$ 0.13         | \$ 0.13         | \$ 0.13         | \$ 0.13       |                           |
| Revenue (x\$1,000)              | \$ -          | \$ 878          | \$ 527          | \$ 369          | \$ 281        | <b>\$ 2,053</b>           |
| <b>Carbon Credits</b>           |               |                 |                 |                 |               |                           |
| Total (x1000 / yr.)             | 18            | 150             | 90              | 63              | 48            | <b>369</b>                |
| Price per credit                | \$ 10         | \$ 10           | \$ 10           | \$ 10           | \$ 10         |                           |
| Revenue (x\$1,000)              | \$ 0          | \$ 1,500        | \$ 900          | \$ 630          | \$ 480        | <b>\$ 3,510</b>           |
| <b>Bedding Savings</b>          |               |                 |                 |                 |               |                           |
| x\$1,000 / yr                   | 140           | 300             | 180             | 126             | 96            | <b>842</b>                |
| <b>Total Revenue (x\$1,000)</b> | <b>\$ 140</b> | <b>\$ 2,678</b> | <b>\$ 1,607</b> | <b>\$ 1,125</b> | <b>\$ 857</b> | <b>\$6,406</b>            |

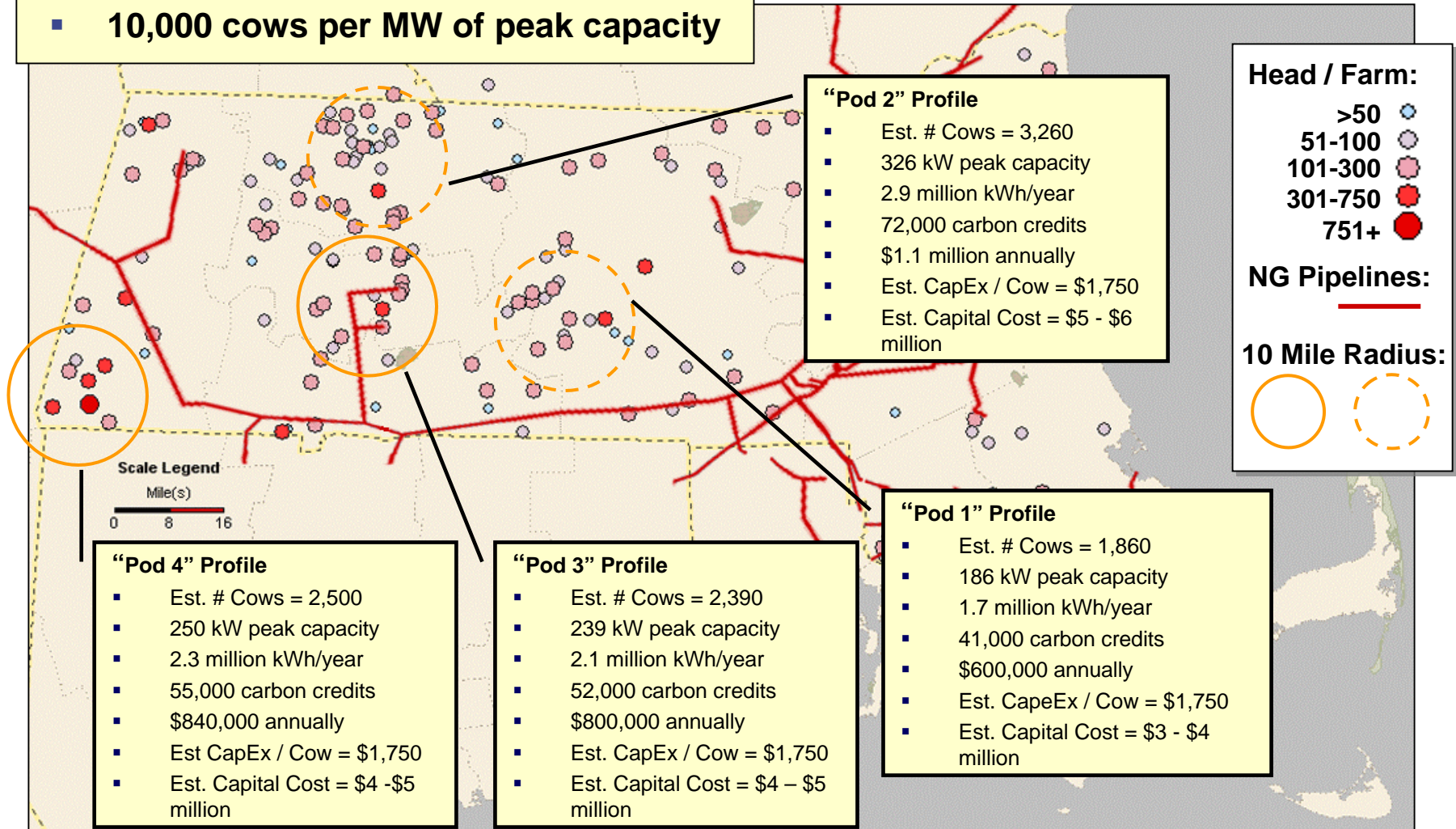
Assumptions: \$0.13 / kWh, \$10 / carbon credit. Dairy data provided by MDAR.

# Mass. "Green Circle" Cow Power Estimated Capital by Herd Size

| Farms                           | Stand-alone Digesters (1 per farm) |                 |                 |                 |                 | Totals                    |
|---------------------------------|------------------------------------|-----------------|-----------------|-----------------|-----------------|---------------------------|
| Cows per Dairy                  | 0-99                               | 100-199         | 200-299         | 300-599         | 600-1315        |                           |
| Number of dairies               | <b>70</b>                          | <b>50</b>       | <b>18</b>       | <b>7</b>        | <b>2</b>        | <b>147</b> (of 165 total) |
| Capital Requirements (x\$1,000) |                                    |                 |                 |                 |                 |                           |
| Per digester/lagoon             | \$ 25                              | \$ 185          | \$ 260          | \$ 500          | \$ 1,200        |                           |
| Total Capital                   | \$ 1,750                           | \$ 9,250        | \$ 4,680        | \$ 3,500        | \$ 2,400        | \$21,580                  |
| Management / finance            | \$ 350                             | \$ 1,850        | \$ 936          | \$ 700          | \$ 480          | \$ 4,316                  |
| <b>Total</b>                    | <b>\$ 2,100</b>                    | <b>\$11,100</b> | <b>\$ 5,616</b> | <b>\$ 4,200</b> | <b>\$ 2,880</b> | <b>\$25,896</b>           |

# Example: One Megawatt of Green Power Capacity

- 10,000 cows per MW of peak capacity



*Total for 4 Pods: 1 MW peak capacity; 9 MM kWh/year; 220,000 Carbon Credits; \$3+ million/yr.*

# Feasibility Requirements

- **Making energy a crop**
- **Achieving 10-year off-take contracts with utilities**
  - Achieve green electricity premiums
- **Turn by-products to revenue generating co-products.**
- **Understanding the hidden costs in electricity contracts**
  - Especially all the components of the interconnect fees
- **Explore bringing additional organic waste to the farm as feedstock to supplement manure and increase green electricity generation and distribution.**
  - MDEP program tie-in and expansion
- **Explore green power vs. renewable natural gas**

# Next Steps

- **Two MTC LORI grants have been submitted**
  - Grant announcement expected in November
- **Secure grant and complete feasibility study's by March 08'**
- **Apply for MTC LORI demonstration funds**
- **Finalize sources of farmer equity**
- **Secure "Project Financing"**